UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/943,237	08/29/2001	Denis H. Endisch	H0001273 (4780)	9386

7590 04/18/2002

Fish & Associates, LLP
Suite 706
1440 N. Harbor Blvd.
Fullerton, CA 92835

EXAMINER
GUERRERO, MARIA F

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 04/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Offic Action Summary	Application N .	Applicant(s)	
	09/943,237	ENDISCH ET AL.	
	Examiner	Art Unit	
	Maria Guerrero	2822	

-- The MAILING DATE f this communication appears n the c v r sheet with th correspond nce address --

Period f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 January 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) *1-11* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. This Office Action is the First Action on the merits.

Claims 1-23 are pending.

Election/Restrictions

2. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-11, drawn to a semiconductor structure, classified in class 257, subclass 506.

II. Claims 12-23, drawn to a method of forming semiconductor devices, classified in class 438, subclass 400.

The inventions are distinct, each from the other because of the following reasons:

Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by another and materially different process. For example, the top portion of the trench could be formed by selectively deposition and the planarizing step could not be required.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Sandra P. Thompson on March 11, 2002 a provisional election was made with traverse to prosecute the invention of Group II, claims 12-23. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-11 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rej cti ns - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

3. Claims 12, 14, 17-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Fulford, Jr. et al. (U.S. 6,008,109).

Fulford, Jr. et al. teaches forming a trench in a substrate having a surface, depositing a first compound (methylsilsesquioxane) into the trench using spin-on deposition, partially removing the first compound from the trench to be below the surface of the substrate, depositing a second compound onto the first compound by chemical vapor deposition (Fig. 5-8a, 10,col. 7, lines 4-50). Fulford, Jr. et al. discloses a thermal oxide coat on the trench, removing the first compound from the trench by a dry etch process, and the second compound being formed from silane (col. 6, lines 15-18, col. 7, lines 25-35).

4. Claims 12-13 are rejected under 35 U.S.C. 102(e) as being anticipated by Gardner et al. (U.S. 6,194,283).

Gardner et al. teaches forming a trench in a substrate having a surface, depositing a first compound (methylsilsesquioxane, hydrogen silsesquioxane) into the trench using spin-on deposition (inherent), partially removing the first compound from the trench to be below the surface of the substrate, depositing a second compound onto the first compound by chemical vapor deposition (Fig. 5-7B, col. 3, lines 15-37, col. 5, lines 30-40, 53-67, col. 6, lines 1-5). Gardner et al. discloses a thermal oxide coat on the trench, removing the first compound from the trench by a dry or wet etch process (col. 5, lines 20-21, 64-67). Gardner et al. teaches planarizing to form the upper surface of the second compound substantially coplanar with the surface of the substrate (Fig. 9, col. 6, lines 15-32).

5. Claims 20-21, 23 are rejected under 35 U.S.C. 102(a) as being anticipated by Endisch et al. (U.S. 6,140,254).

Endisch et al. teaches spin-depositing a spin-on compound (comprising silicon) on a surface of a substrate, spin-rinsing the spin-on compound with a solvent mixture, the solvent mixture comprising a first solvent (ketone, ether) that dissolves the spin-on compound, and the second solvent (water, alcohol) that is inert to the spin-on compound (Abstract, col. 4, lines 20-35, col. 5, lines 1-10, col. 6, lines 5-35, col. 7, lines 1-10, 20-25, 55-60, col. 8, lines 25-30, col. 9, lines 10-35). Endisch et al. discloses heating the substrate to remove the solvent mixture and curing the spin-on compound (col. 6, lines 35-45, col. 8, lines 30-40).

Claim R j cti ns - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner et al. (U.S. 6,194,283) in view of Koyanagi (U.S. 6,191,002).

Regarding claims 15-16, Gardner et al. discloses the first compound being an oxide and the trench having an aspect ratio greater than 0.8 (col. 5, lines 30-35, col. 8, lines 10-13).

Gardner et al. fails to show curing the first compound to form an oxide, the aspect ratio being no less than 5. However, Koyanagi shows spin coating silicon containing material on the trench and curing the silicon containing material to form the oxide. Koyanagi also teaches the trench having the aspect ratio of 5 (col. 7, lines 60-63, col. 8, lines 1-20, col. 9, lines 20-25, col. 12, lines 15-36).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to include the step of curing the first compound to form the oxide and to use the aspect ratio of 5 as taught Koyanagi. The modification would prevent voids, cracks and depressions in the isolation structure (Koyanagi, col. 4, lines 50-55; Gardner et al., col. 1, lines 8-10).

7. Claim 22 is rejected under 35 U.S.C. 103(a) as being obvious over Endisch et al. (U.S. 6,140,254) in view of Kurosawa et al. (U.S. 6,011,123).

Regarding claim 22, Endisch et al. teaches other solvents which are compatible with the other ingredients can be readily determined by those skilled in the art (col. 6, lines 54-56, col. 7, lines 1-5).

Endisch et al. fails to show the first and second solvent being propyl acetate and ethyl acetate. However, the use of these solvents is conventional in the art as taught Kurosawa et al. (col. 13, lines 18-25, 35-40, 60-65, col. 14, lines 10-15, 30-32).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to include the use of propyl acetate and ethyl acetate as taught Kurosawa et al. because the selection of a compatible solvent is within the capabilities of a person of ordinary skill in the art.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Liou et al. (U.S. 5,130,268), Kalnitsky et al. (U.S. 5,435,888), and Tseng (U.S. 6,271,147) show the use of spin-on deposition on a trench and the use of TEOS (tetraethylorthosilicate) as conventional in the art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 703-305-0162.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on 703-308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-

308-7722 for regular communications and 703-308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

MG
April 12, 2002

Michael Trinh
Primary Examiner